encoding the received data for transmission via a financial verification network;

converting the encoded received data into a set of audio tones, wherein a first portion of the set of audio tones represents a first portion of the encoded received data and a second portion of the set of audio tones represents a second portion of the encoded received data; and

transmitting the set of audio tones over a voice channel of a digital wireless telecommunications network.

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34. (New) A method of verifying financial transactions according to claim 33 wherein the set of audio tones includes first audio tones having a first frequency selected so as to avoid frequencies that are characteristic of human voice.

35. (New) A method of verifying financial transaction according to claim 34 wherein the set of audio tones includes second audio tones having a second frequency selected so as to avoid frequencies that are characteristic of human voice.

Remarks

An Information Disclosure Statement is submitted herewith that includes an International Search Report mailed 11 December 2002 in connection with a corresponding PCT Application (PCT/US02/21969). The ISR (and the IDS) cite four references as being of particular relevance in the opinion of the searcher.

The first is U.S. Patent No. 5,850,599 (Seiderman), with reference to column 6, lines 12-15, lines 29-31; column 7, lines 29-32; column 18, lines 61-63. The Seiderman patent is directed to a portable cellular telephone with a credit card debit system. Seiderman's portable cell phone can be used, for example, in a rental car to enable the driver to make phone calls and charge them to his credit card. The system includes a credit card reader coupled to a cell phone. Further, according to the Abstract, "the cellular telephone also includes electronic circuitry which establishes a first telephone

communications link with the network and transmits, via the transceiver unit for the phone, to the network, credit card data, a cellular telephone ID data, and the telephone number input into the handset by the user [the destination number]." In the system described, the cell phone initially (and automatically) places a call to "a particular IXC within the telecommunications network where the credit card data is further validated through a validation or verification computer system 47." Column 7, lines 29□32. An IXC is a company that validates credit cards and bills charges to them. Column 3, line 13.

It is important to understand the nature of the "telecommunications network" described in the Seiderman patent. Referring to Figure 1, the "telecommunications network" 36 includes the cellular (wireless) carrier network 46, switch 48, call record system 49, and the local telco (PSTN) 50. To begin operation, the processor coupled to the cell phone employs a predetermined "placement phone number" to place a call via the wireless network 46 to the IXC, or switch 48. The wireless network itself interacts with the cell phone processor and the switch in an integrated fashion. "According to the present invention, local cellular carrier 46 is electronically coupled and is part of the telecommunications network 36 that includes switch 48, telephone company lines 50, and call record system 49." Column 7, lines 3-6.

More specifically, a communications protocol is established between the cellular telephone and the cellular network. Refer to the call protocol table at column 14, line 60 through column 15, line 8. "The cellular telephone calls the telecommunications network using the determined call placement telephone number. The network provides a handshake . . . ." Column 15, lines 9-12. "In step 3 of the protocol, the cellular telephone sends the cellular telephone ID to the cellular network. This ID at least includes the TID and may further include the MID. The network then provides a handshake. . . ." Column 15, lines 12-20. Seiderman thus teaches a system that leverages integrated telecommunications networks in

that a communications protocol is established for interaction between the cell phone and the network (rather than a destination telephone or other call-taker unit) to accomplish call setup, credit card verification, billing, etc. As indicated at column 6, line 30, and at column 18, with reference to Figure 4, DTMF signaling is used between the cell phone and the network for transmission of data such as the destination phone number or cell phone ID. That data communication, however, involves interaction with the telecom network.

The foregoing system is contrary to the present invention which requires no interaction with the telecommunications network itself. In other words, the telecom network is used merely as a passive conduit and it is not involved in the credit card approval process other than the mere fact of establishing a voice channel call. In prior art systems such as the Seiderman patent, special arrangements must be made with the carrier in advance, and provisions must be made both in the carrier network and in the cell phone to implement a predetermined protocol for the kinds of interactions described by Seiderman. Of course, separate arrangements must be made with each wireless carrier or service provider as necessary to carry out the credit card approval process using their network.

According to the applicant's present invention, credit card verification can be done simply and easily using any wireless carrier, because the data transmission proceeds in the voice channel, not in the overhead control channel, and is entirely transparent to the wireless carrier. In accordance with the present invention, no special protocol need be established with the wireless carrier. A preferred embodiment of the present invention employs audio tones for data communication, but it is distinguished from the system described by Seiderman in that the present invention calls for "receiving via a voice channel of a digital wireless telecommunications network a set of audio tones representing a merchant financial verification request," etc (claim 1). Seiderman and the like teach a system that requires special protocols

implemented in the telecom network employing the overhead or control channel, not the voice channel.

The next reference cited in the International Search Report is U.S. Patent No. 5,978,676 to Guridi, *et al.*, directed to "inband signal converter, and associated method, for a digital communication system." Guridi, *et al.*, teach a system for converting an inband signal, such as a DTMF signal, into a form to permit transmission via a digital wireless communication network. The problem is that "vocoders used in some digital transceivers do not guaranty wave form integrity. For instance, when a DTMF signal is applied to such vocoders, accurate encoding of the DTMF signal to permit its later recreation cannot be guaranteed." Guridi, *et al.*, Column 1, lines 26-30. The solution, according to Guridi, *et al.*, is to detect a DTMF signal at the input and convert it into a code or a form or a transmission by the digital transceiver. On the other hand, ordinary audio input is passed through without encoding. The system taught by Guridi, *et al.*, is similar to that of the Seiderman patent discussed above in that it employs the control channel — a digital data channel, not a voice channel — for data communication. Specifically, "the line interface part 74 includes circuitry which detects the generation of a DTMF signal on the line 64. When the input signal applied to such circuitry by way of the line 64 is detected to include a DTMF signal, the DTMF signal is encoded to form, *e.g.*, a logical signal. The encoded signal is applied to the transceiver unit 84, and a signal representative thereof is transmitted." Column 8, lines 21-26. In a GSM communication system, "the cellular transceiver is thereby operable to transmit the coded signal upon a control channel in a manner defined in the standard specification for GSM communications." Lines 33-37. [Emphasis added.]

On the other hand, when the input signals do not receive include DTMF signals, the signals are applied directly to the transceiver unit 84. Again, in a GSM system, "the cellular transceiver is operable to transmit the signal upon a traffic channel according to the protocols and procedures set forth in the standard specification for GSM." Lines 41-46. Thus, according

to Guridi, *et al.*, when DTMF tones are detected they are encoded into digital form, and transmitted over the control channels of the wireless telecom system. See Figure 7, illustrating control channels and traffic channels; and see the flow diagram of Figure 8 illustrating the process of detecting when the input signal forms an inband signal (*e.g.*, DTMF) 244, determining values of the inband signal 256, encoding the signal 248, and finally "transmit encoded signal on a control channel" 252. [Emphasis added.] Thus, the system described by Guridi, *et al.*, avoids the problem of corruption of DTMF data in the vocoders by simply encoding that information as digital codes and sending it over the digital control channel, thereby avoiding the traffic channel.

Applicant's present invention takes an entirely different approach. It provides for modifying the DTMF data into a form such that it will pass through the traffic channel (voice channel) without corruption. It does not involve the overhead control channel, and therefore can be used with GSM or any other digital wireless network without involving the network and, in particular, without complying with network-specific overhead control channel protocols.

In claim 3, for example, the method includes "defining one or more control codes reserved for communication control signaling over the voice channel, each control code comprising one or more alpha-numeric characters; establishing a digital voice channel connection between the RCA and the call receiver apparatus (CRA)," etc. These steps are radically different from the prior art where communication control signaling occurs exclusively on the overhead/control channel rather than the traffic or voice channel. Claim 3 further calls for converting the selected control code into an audio tone representation, formatting the audio tones in a vocoder so as to form digital transmission data, in transmitting the digital transmission data over the digital voice channel connection, and finally, "detecting the control code to effect control signaling transparently over the voice channel." The prior art discussed above does not disclose or suggest using the voice channel for

control signaling. The control signaling contemplated by the present invention pertains to control codes to be used by the receiving apparatus rather than the wireless network.

With regard to claims 8-16, once again the present invention calls for encoding the digital data into a series of audio frequency tones; "each audio frequency tone having a frequency selected so as to avoid frequencies that are characteristic of human voice, thereby minimizing interference with simultaneous voice traffic on the channel." The digital data as described in claim 4 (the base claim) is transmitted (in the form of audio tones) "over a voice channel of a digital wireless telecommunications network." Guridi, *et al.*, encode the digital data and transmit it over the overhead control channel. Seiderman also requires interaction with the wireless carrier network and adherence to its special protocol for data transmission in the overhead channel.

U.S. patent no. 5,574,773 to Grob, *et al.*, discloses a "method and apparatus of providing audio feedback over a digital channel." This patent also recognizes the problem that vocoders are tailored to sample and compress human voice. "Because modem tones differ significantly from human voice, the vocoder can cause critical degradation to the modem tones . . . a more efficient, flexible, and reliable transmission means is to provide a mechanism to transmit the digital data over the digital wireless link directly." Column 1, lines 35-46. In other words, Grob, *et al.*, teach sending digital data directly over the digital wireless control channel rather than the voice traffic channel. Grob is directed to providing audible feedback to the user for monitoring the initiation of a digital data connection, much like a conventional modem using a landline where the handshaking protocols can be overheard. This patent mentions that "terminals that connect by telephone networks can be fax machines, personal computers, credit card verification machines, and telemetry devices." Column 2, line 67. However, it does not suggest the *transparent inband signaling* techniques of the present invention.

In the system of Grob, *et al.*, terminal equipment 10 produces digital data 110 representative of information to be transmitted. Mobile unit 60 encodes the digital data and outputs the encoded data over a wireless communication link The encoded data is the received at a base station 80 and converted by modem 70 and a DSP to its original analog format. Base station 80 then passes the analog signal to a PSTN for routing to the intended recipient. *See* column 3, lines 44-59. Consequently, Grob, *et. al.* requires the mobile unit and the wireless network to use the same protocol for transmitting digital data.

Furthermore, Grob, *et. al.*, teaches away from the system used in applicant's invention in that voice and data calls are treated differently by the wireless network. Grob, *et. al.*, states that " a voice connection is different from a data connection. Base station 80 must route an incoming call to DSP and modem 70 if it is a data connection and to vocoder 85 if it is a voice connection." Column 5, lines 21-25. In applicant's invention the credit card verification data is encoded into a voice channel, and is handled by a wireless network just as any other voice call. In applicant's present invention the telecom network is used merely as a passive conduit and it is not involved in the process other than the mere fact of establishing a voice channel call. In prior art such as the Grob, *et. al.*, patent, special arrangements must be made with the carrier, and provisions must be made both in the carrier network and in the cell phone to implement a predetermined protocol for the kinds of interactions described by Grob, *et. al.* Of course, separate arrangements must be made with each wireless carrier or service provider as necessary to carry out the credit card approval process using their network.

U.S. patent no. 6,206,283 to Bansal, *et al.*, is directed to a method and apparatus for transferring money via a telephone call. It was cited in the International Search Report as relevant to claim 6 alone, with reference to column 1, lines 41-67. This patent contemplates the use of either a landline or a wireless communication network. In the latter situation, "the information could be transferred from the user's wireless telephone using

touch-tones, for example, or any other wireless protocol, such as a protocol being used to communicate with the Mobile Switching Center (MSC). One such example used in personal communication services (PCS) is IS-41 Management Application Protocol (MAP)." Column 3, lines 36-43. IS-41 (Interim Standard 41) is a signaling protocol used in the North American Standard Cellular System. It includes pre-call validation of the ESN-MIN combination in order to ensure the legitimacy of the originating device. The IS-41 MAP is of course an overhead control channel signaling protocol. "One exemplary embodiment of the present invention uses a button on the telephone itself, such as a button having a dollar symbol ($) on it, that when pressed transfers codes to the Mobile Switching Center to indicate that the telephone call is a money transfer. Then, by pressing the $ button, followed by a numerical sequence, a user could easily perform a secure electronic money transfer." Column 4, lines 33-39. Thus, as in the other systems described above, it becomes necessary to implement a control signaling with the telecom network, as in the system described by Seiderman, as distinguished from a transparent end-to-end data communication exclusively over the voice channel as in accordance with the present invention. For these reasons, the present claims are patentable over the prior art of record and should be allowed.

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Complete Set of Pending Claims
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20. (New) A method of verifying a financial transaction comprising:

receiving via a voice channel of a digital wireless telecommunications network a set of audio tones representing a merchant financial verification request, a first tone in the set of audio tones representing a first binary portion of the financial verification request, and a second tone in the set of audio tones representing a second portion of the financial verification request;

converting the received set of audio tones into a financial verification request; and

analyzing the financial verification request to determine whether to transmit an authorization message.

21. (New) The method of claim 20 including generating an authorization message and converting the message to a second set of audio tones for transmission via the digital wireless telecommunications network.

22. (New) The method of claim 20 including the steps of:

providing a wireless remote communication apparatus ("RCA") having a vocoder for transmitting and receiving human voice content over a voice channel of the digital wireless communication network;

providing a call receiver apparatus ("CRA") also capable of transmitting and receiving human voice content over a voice channel of the digital wireless communication network;

defining one or more control codes reserved for communication control signaling over the voice channel, each control code comprising one or more alpha-numeric characters;

establishing a digital voice channel connection between the RCA and the call receiver apparatus CRA;

in a first one of the RCA and the CRA, selecting one of the communication control codes for transmission to the other one of the RCA and the CRA;

in the first one of the RCA and the CRA, converting the selected control code into an audio tone representation;

in the first one of the RCA and the CRA, formatting the audio tones in a vocoder so as to form digital transmission data;

in the first one of the RCA and the CRA, transmitting the digital transmission data over the digital voice channel connection to the other one of the RCA and the CRA; and

in the other one of the RCA and the CRA, detecting the control code to effect control signaling transparently over the voice channel.

23. (New) A wireless financial transaction verification apparatus comprising:

a transaction information terminal operable to communicate financial transaction information over a financial verification network;

a converter operatively connected to the transaction information terminal, the converter operable to convert the financial transaction information into a set of audio tones ;

a wireless communication device operably connected to the converter such that the wireless communication device can receive the set of audio tones from the converter and transmit the received audio tones over a voice channel of a digital wireless telecommunications network.

24. (New) A wireless financial transaction verification apparatus according to claim 23 wherein the transaction information terminal includes a card scanner.

25. (New) A wireless financial transaction verification apparatus according to claim 23 wherein the transaction information terminal includes an input device for entry of a transaction amount.

26. (New) A wireless financial transaction verification apparatus according to claim 23 wherein the terminal includes a display for displaying a received approval status message.

27. (New) A wireless financial transaction verification apparatus according to claim 23 wherein the converter comprises a input for receiving digital data from the transaction information terminal and a tone generation module for encoding the digital data into a series of audio frequency tones; each audio frequency tone having a frequency selected so as to avoid frequencies that are characteristic of human voice thereby minimizing interference with simultaneous voice traffic on the channel.

28. (New) A wireless financial transaction verification apparatus according to claim 27 wherein the wireless communications device comprises:

a voice/data signal encoder/decoder (vocoder) for sampling the audio frequency tones and forming digital signals for transmission over the digital wireless telecommunication network; and

a transmission system for transmitting the digital signals over the voice channel of the digital wireless telecommunication network.

29. (New) A wireless financial transaction verification apparatus according to claim 23 wherein the wireless communication device is a digital cellular telephone.

30. (New) A system for verifying financial transactions between a customer and a merchant, the merchant having a credit card verification terminal operable to receive data representing a financial transaction and encode the received data for transmission via a financial verification network comprising:

a converter operably coupled to the credit verification terminal to accept the encoded received data from the credit card verification terminal and convert the encoded received data in a set of audio tones;

a cellular communications device operably coupled to the converter for receiving the set of audio tones from the converter and transmitting the

audio tones over a voice channel of a digital telecommunications network to a financial verification facility.

31. (New) A system according to claim 30 wherein the set of audio tones have a frequency that is selected so as to avoid frequencies that are characteristic of human voice thereby minimizing interference with simultaneous voice traffic on the voice channel.

32. (New) A system according to claim 30 wherein the cellular communication device includes a voice/data signal encoder/decoder (vocoder) operable to sample the set of audio tones and form a digital signal for transmission over the voice channel of the digital wireless telecommunication network

33. (New) A method of verifying financial transactions comprising:

receiving data representing a financial transaction at a financial transaction verification terminal;

encoding the received data for transmission via a financial verification network;

converting the encoded received data into a set of audio tones, wherein a first portion of the set of audio tones represents a first portion of the encoded received data and a second portion of the set of audio tones represents a second portion of the encoded received data; and

transmitting the set of audio tones over a voice channel of a digital wireless telecommunications network.

34. (New) A method of verifying financial transactions according to claim 33 wherein the set of audio tones includes first audio tones having a first frequency selected so as to avoid frequencies that are characteristic of human voice.

35. (New) A method of verifying financial transaction according to claim 34 wherein the set of audio tones includes second audio tones having a second frequency selected so as to avoid frequencies that are characteristic of human voice.